



USG10R076M

POWER MOSFET

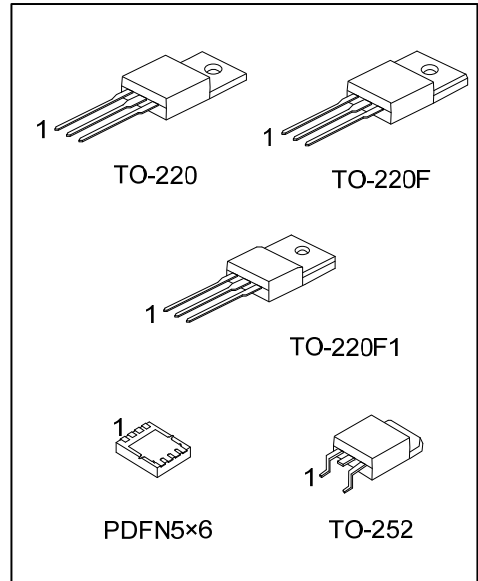
N-CHANNEL SGT ENHANCEMENT POWER MOSFET

■ DESCRIPTION

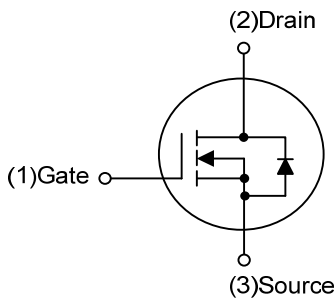
The UTC **USG10R076M** is a N-channel Power MOSFET, it uses UTC's advanced technology to provide the customers with low $R_{DS(ON)}$ characteristic by high cell density trench technology.

■ FEATURES

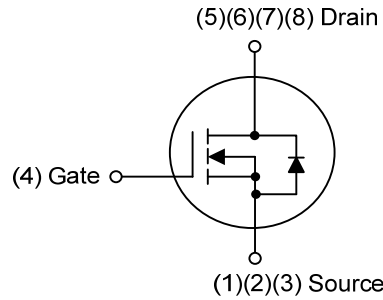
- * $R_{DS(ON)} \leq 7.6 \text{ m}\Omega @ V_{GS}=10\text{V}, I_D=32\text{A}$
- $R_{DS(ON)} \leq 11 \text{ m}\Omega @ V_{GS}=4.5\text{V}, I_D=20\text{A}$
- * Extremely low on-resistance $R_{DS(ON)}$
- * Excellent Low Ciss



■ SYMBOL



TO-220 / TO-220F
TO-220F1 / TO-252



PDFN5x6

■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment								Packing	
Lead Free	Halogen Free		1	2	3	4	5	6	7	8		
USG10R076ML-TA3-T	USG10R076MG-TA3-T	TO-220	G	D	S	-	-	-	-	-	-	Tube
USG10R076ML-TF1-T	USG10R076MG-TF1-T	TO-220F1	G	D	S	-	-	-	-	-	-	Tube
USG10R076ML-TF3-T	USG10R076MG-TF3-T	TO-220F	G	D	S	-	-	-	-	-	-	Tube
USG10R076ML-TN3-R	USG10R076MG-TN3-R	TO-252	G	D	S	-	-	-	-	-	-	Tape Reel
USG10R076ML-P5060-R	USG10R076MG-P5060-R	PDFN5x6	S	S	S	G	D	D	D	D	D	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>USG10R076MG-TA3-T</p> <ul style="list-style-type: none"> (1)Packing Type (2)Package Type (3)Green Package 	<ul style="list-style-type: none"> (1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F TN3: TO-252, P5060: PDFN5x6 (3) G: Halogen Free and Lead Free, L: Lead Free
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■ MARKING

TO-220 / TO-220F / TO-220F1	TO-252
<p>UTC USG10R076M □ □□□□□ Lot Code ← → Date Code 1 L: Lead Free G: Halogen Free</p>	<p>UTC USG 10R076M □ □□ □□□□ Lot Code ← → Date Code 1 L: Lead Free G: Halogen Free</p>
PDFN5×6	-
<p>UTC USG 10R076M • □□□□□ Lot Code ← → Date Code</p>	-

■ ABSOLUTE MAXIMUM RATING ($T_C=25^\circ\text{C}$ unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain-Source Voltage		V_{DSS}	100	V	
Gate-Source Voltage		V_{GSS}	± 20	V	
Drain Current	DC	I_D	65	A	
	Pulsed (Note 2)	I_{DM}	130	A	
Avalanche Energy		Single Pulsed (Note 3)	E_{AS}	2.7	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	10.3	V/ns	
Power Dissipation	TO-220	P_D	100	W	
	TO-220F/TO-220F1		31	W	
	TO-252		53	W	
	PDFN5x6		43	W	
Junction Temperature		T_J	+150	$^\circ\text{C}$	
Storage Temperature Range		T_{STG}	-55 ~ +150	$^\circ\text{C}$	

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature

3. $L = 0.1\text{mH}$, $I_{AS} = 7.4\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 30\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1			
	TO-252		110	$^\circ\text{C}/\text{W}$
	PDFN5x6		65 (Note)	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.25	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		4.0	$^\circ\text{C}/\text{W}$
	TO-252		2.36 (Note)	$^\circ\text{C}/\text{W}$
	PDFN5x6		2.9 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

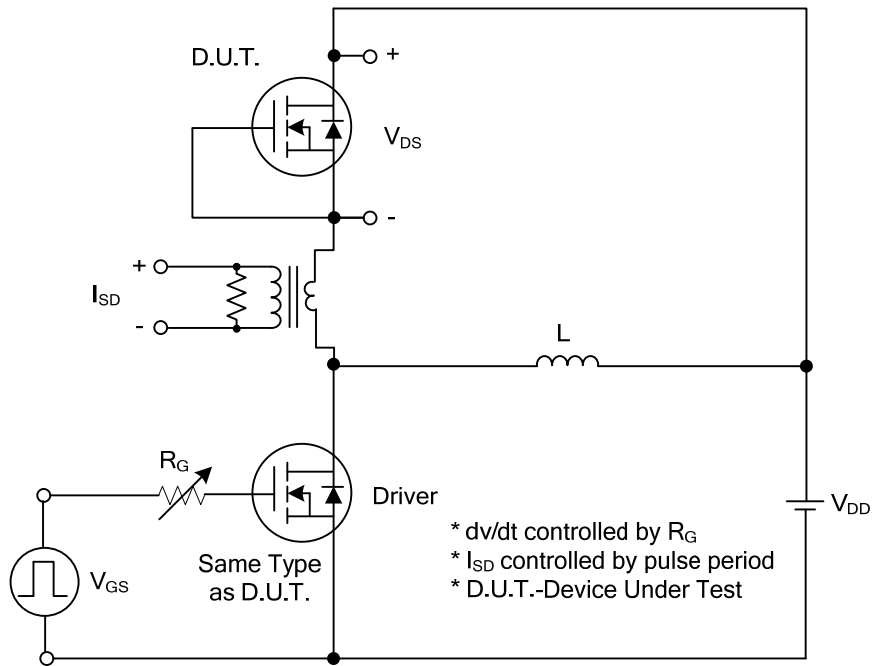
■ ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V, I _D =250μA	100			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =100V, V _{GS} =0V			1	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{GS} =+20V, V _{DS} =0V			+100	nA
	Reverse		V _{GS} =-20V, V _{DS} =0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} = V _{GS} , I _D =250μA	1.0		2.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} = 10V, I _D =32A			7.6	mΩ
			V _{GS} = 4.5V, I _D =20A			11	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		2593		pF
Output Capacitance		C _{OSS}			1027		pF
Reverse Transfer Capacitance		C _{RSS}			189		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =80V, V _{GS} =10V, I _D =65A (Note 1, 2)		82		nC
Gate to Source Charge		Q _{GS}			9		nC
Gate to Drain Charge		Q _{GD}			32		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =50V, V _{GS} =10V, I _D =65A, R _G =3Ω (Note 1, 2)		12		ns
Rise Time		t _R			20		ns
Turn-OFF Delay Time		t _{D(OFF)}			40		ns
Fall-Time		t _F			23		ns
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				65	A
Diode Forward Voltage		V _{SD}	I _F =65A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	V _R =50V, I _S =30A, V _{GS} =0V,		55		nS
Reverse Recovery Charge		Q _{rr}	dI _F /dt = 100A/μs		100.9		nC

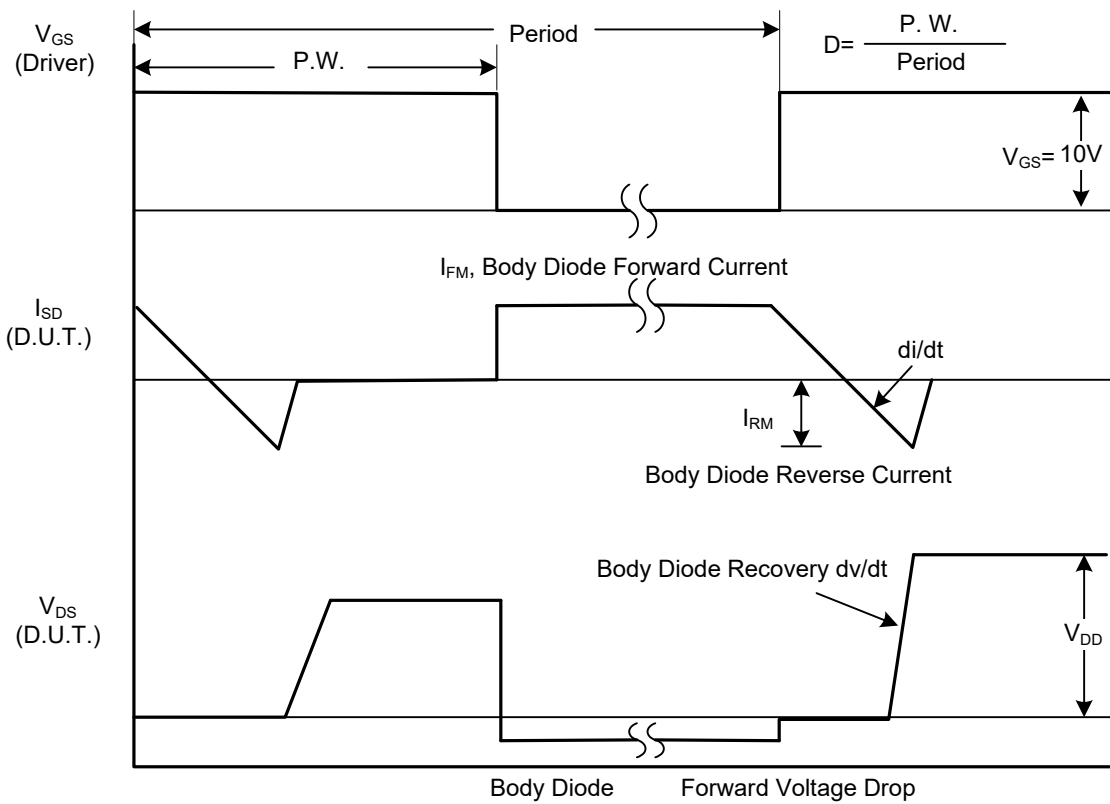
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

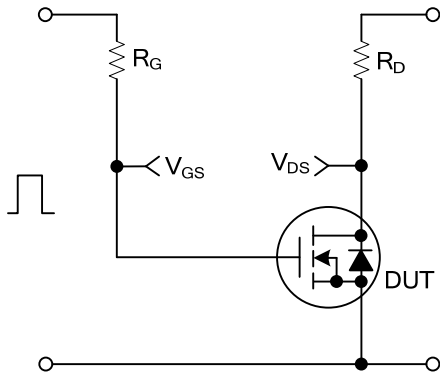


Peak Diode Recovery dv/dt Test Circuit

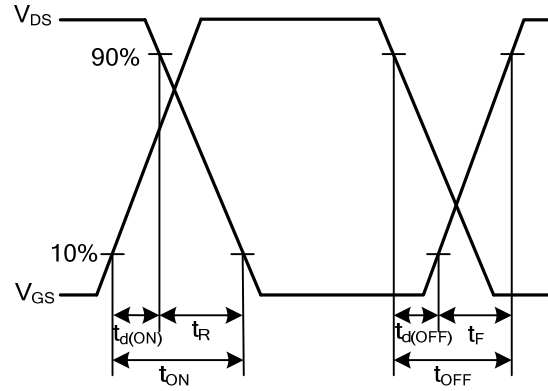


Peak Diode Recovery dv/dt Waveforms

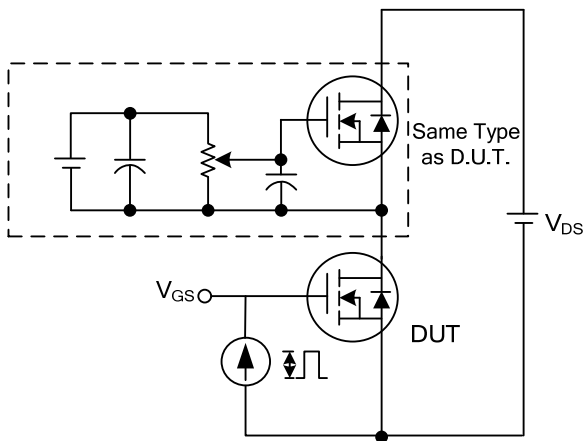
TEST CIRCUITS AND WAVEFORMS



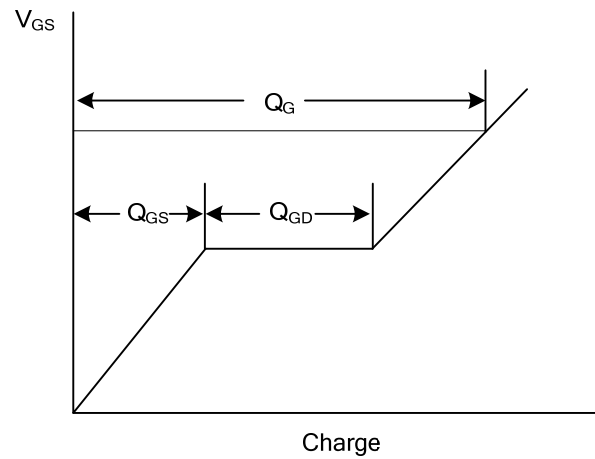
Switching Test Circuit



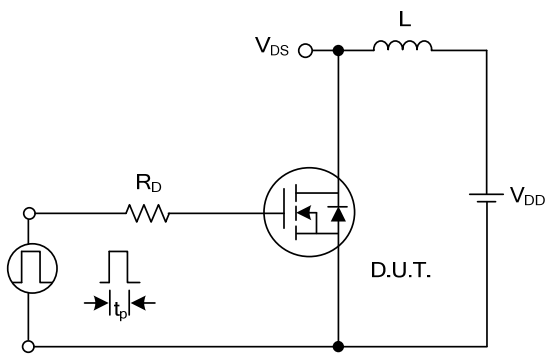
Switching Waveforms



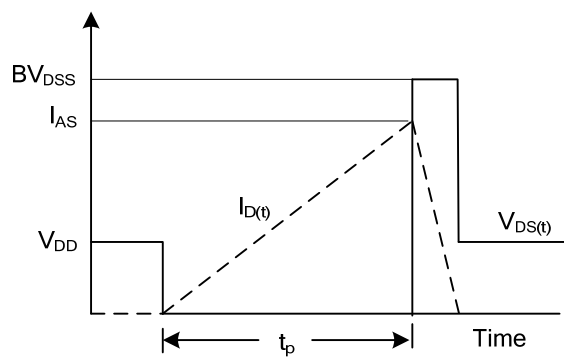
Gate Charge Test Circuit



Gate Charge Waveform

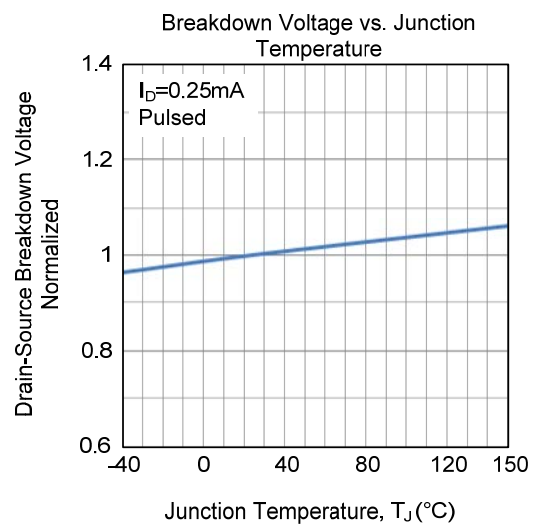
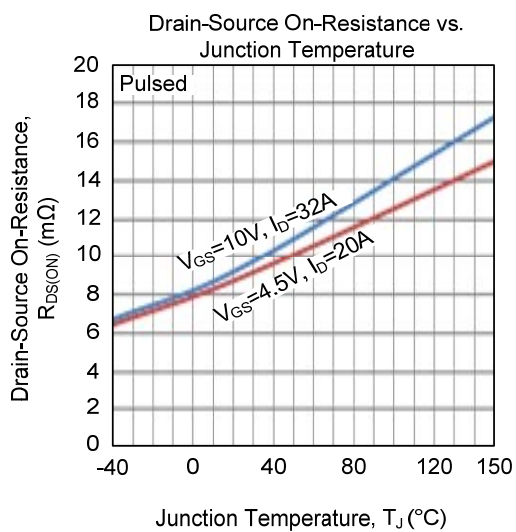
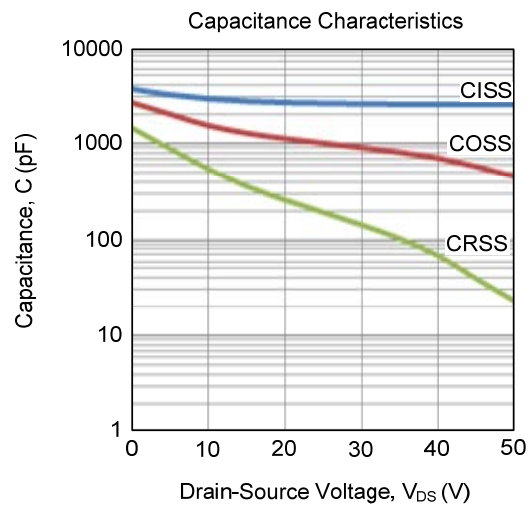
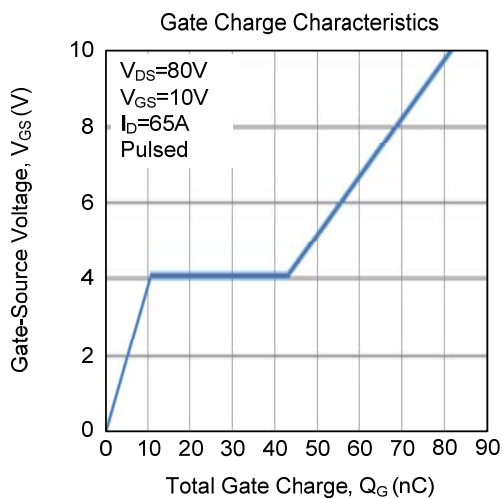
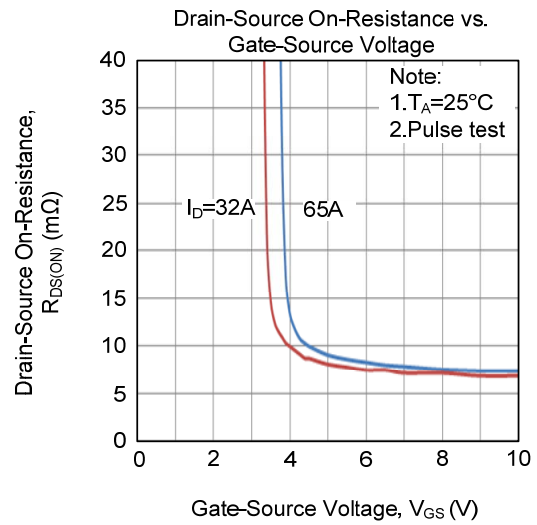
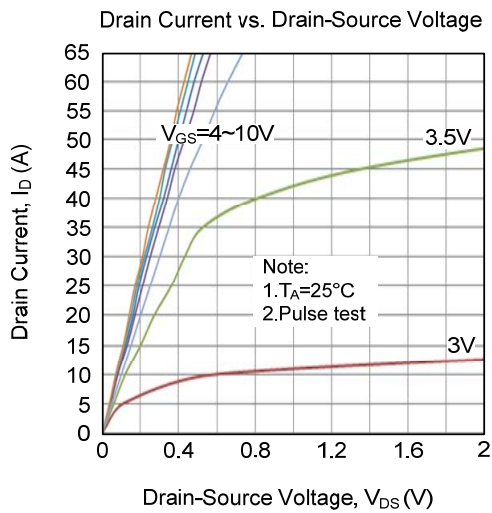


Unclamped Inductive Switching Test Circuit

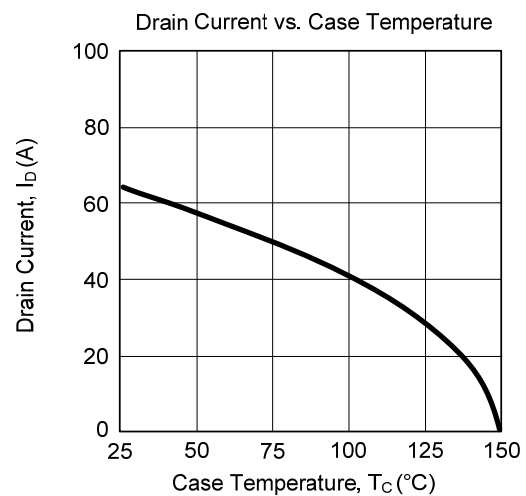
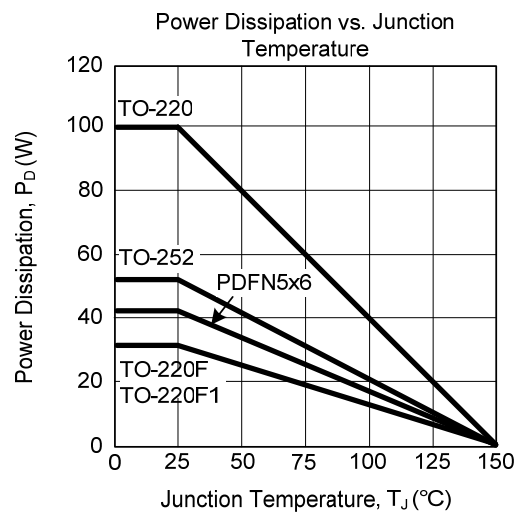
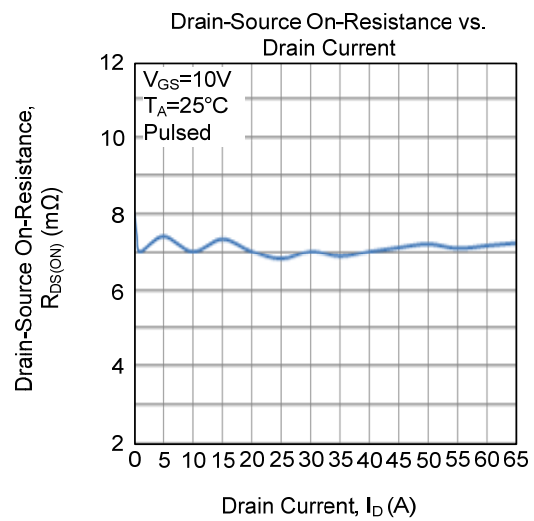
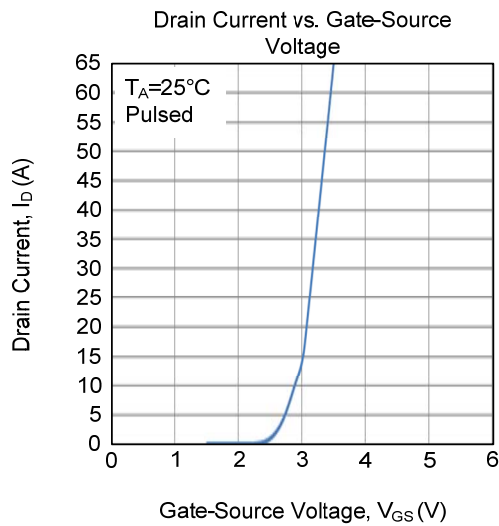
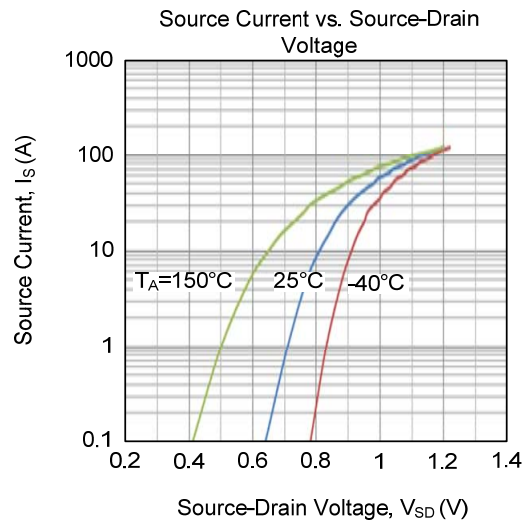
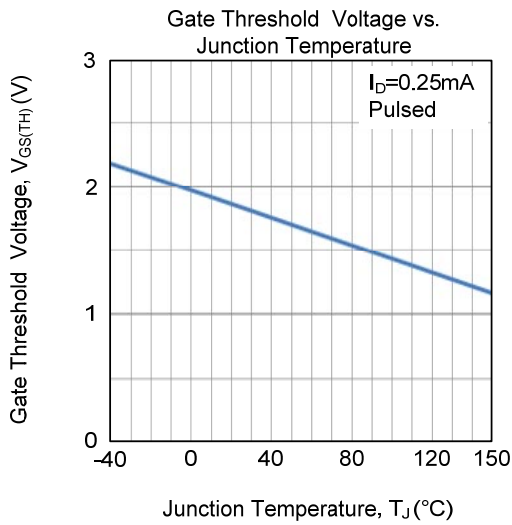


Unclamped Inductive Switching Waveforms

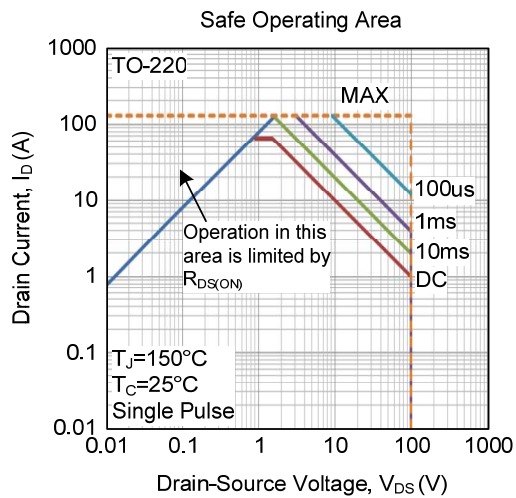
TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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